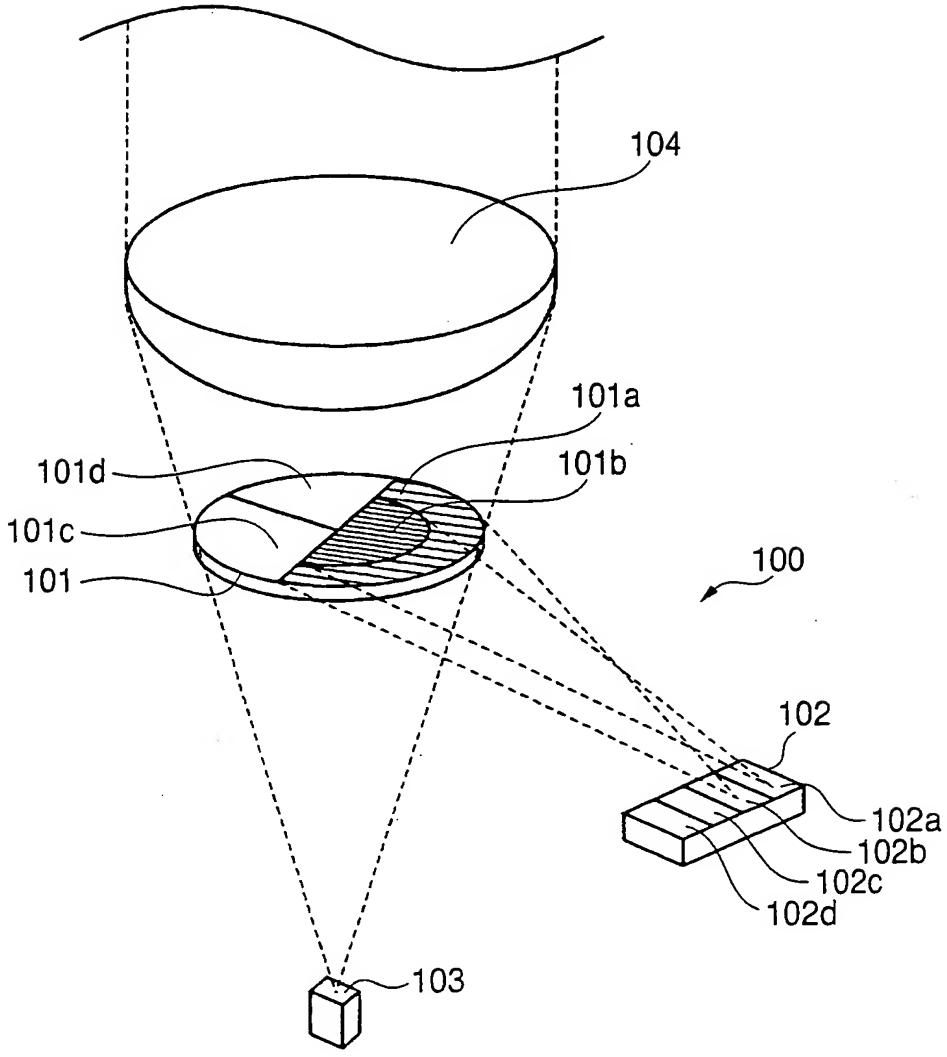
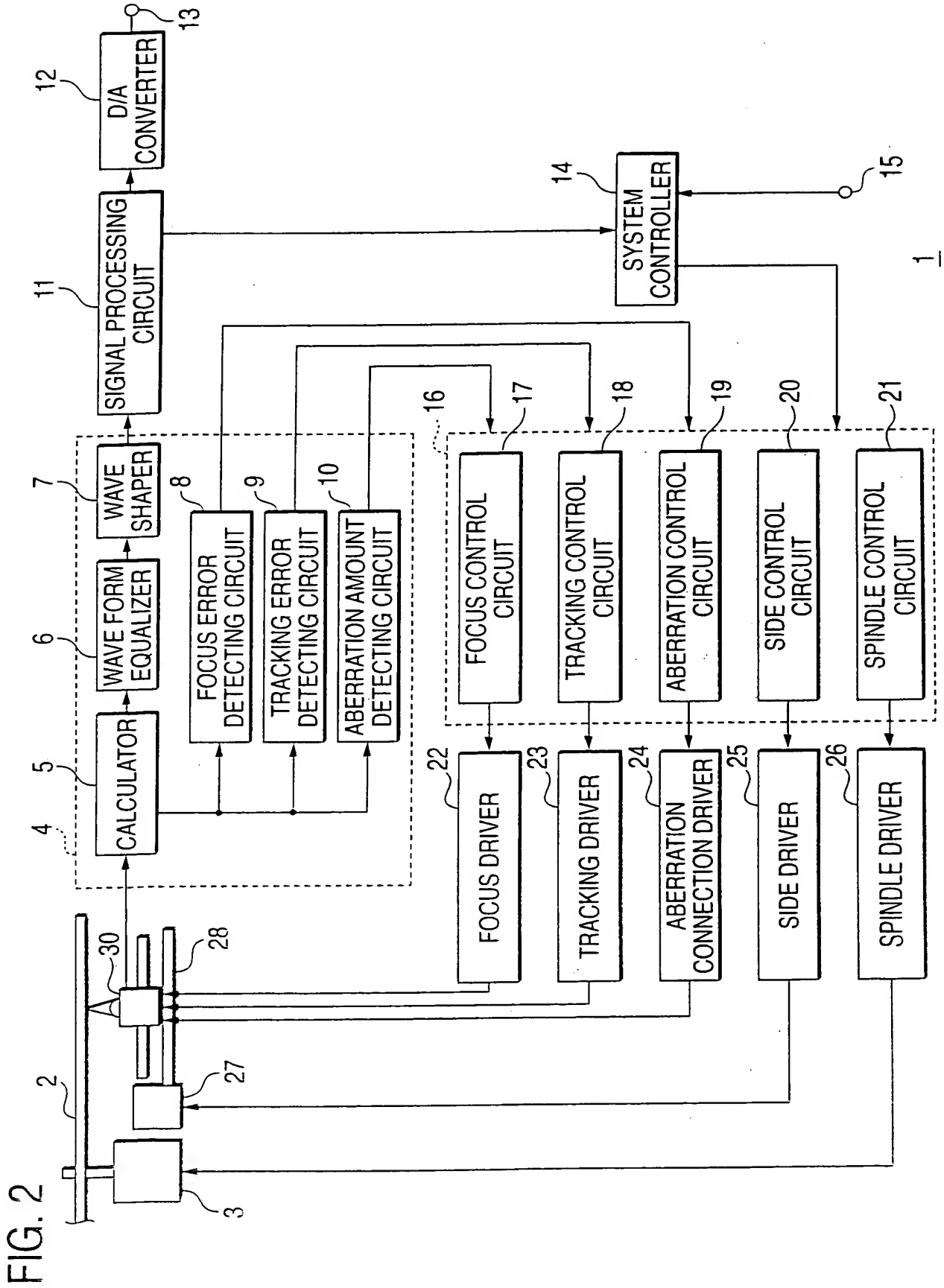
JC67 U.S. PTO
APR 19 2004

OBLON, SPIVAK, et al
Docket No: 244893US2
Inventor: Giichi SHIBUYA, et al.
Serial No: 10/699,855
Reply to NFCAP dated: February 17, 2004
Replacement Sheet

FIG. 1




1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
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18
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20
21
22
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24
25
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28
30
D/A CONVERTER
SIGNAL PROCESSING CIRCUIT
SYSTEM CONTROLLER
WAVE SHAPER
WAVE FORM EQUALIZER
CALCULATOR
FOCUS ERROR DETECTING CIRCUIT
TRACKING ERROR DETECTING CIRCUIT
ABERRATION AMOUNT DETECTING CIRCUIT
FOCUS CONTROL CIRCUIT
TRACKING CONTROL CIRCUIT
ABERRATION CONTROL CIRCUIT
SIDE CONTROL CIRCUIT
SPINDLE CONTROL CIRCUIT
FOCUS DRIVER
TRACKING DRIVER
ABERRATION CONNECTION DRIVER
SIDE DRIVER
SPINDLE DRIVER

FIG. 2

FIG. 3

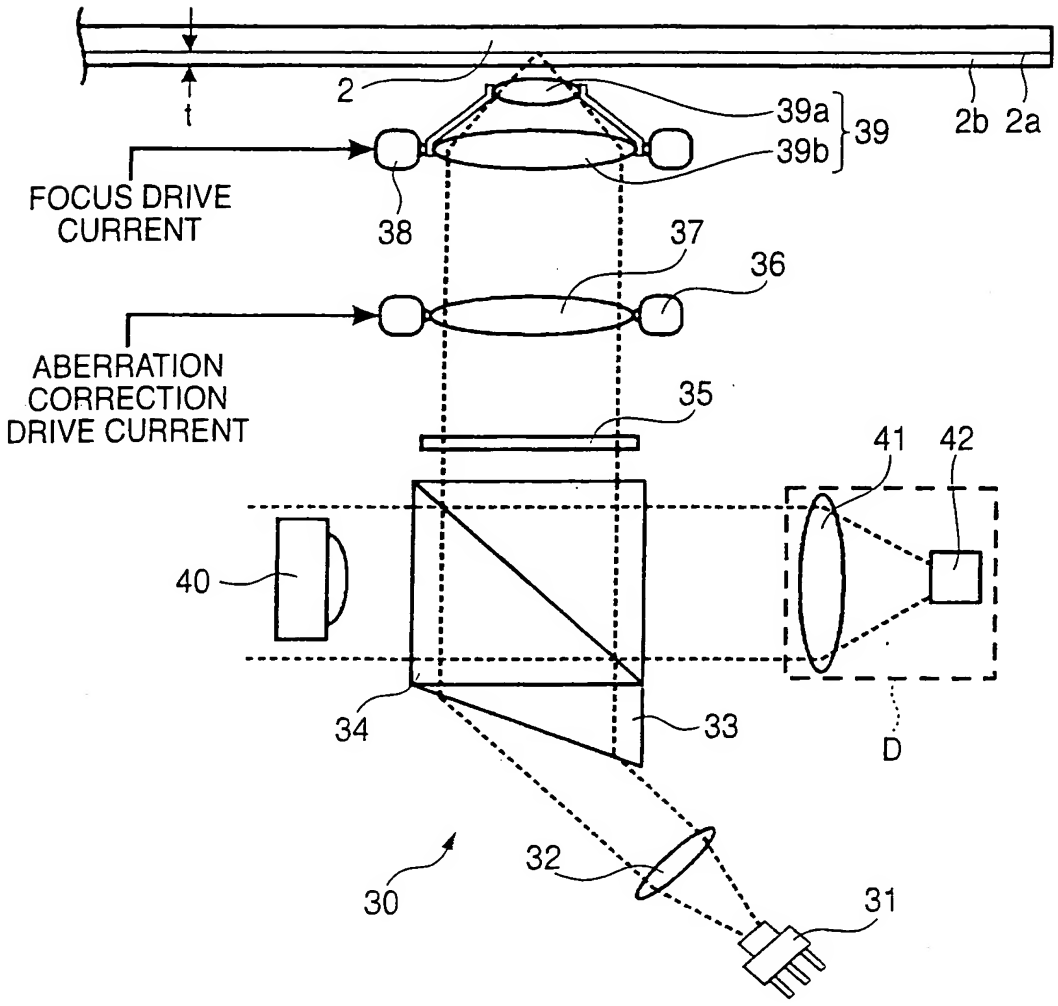

t
2
39a
39b
39
2b
2a
FOCUS DRIVE CURRENT
38
37
36
ABERRATION CORRECTION DRIVE CURRENT
35
41
42
40
34
33
D
30
32
31

FIG. 4

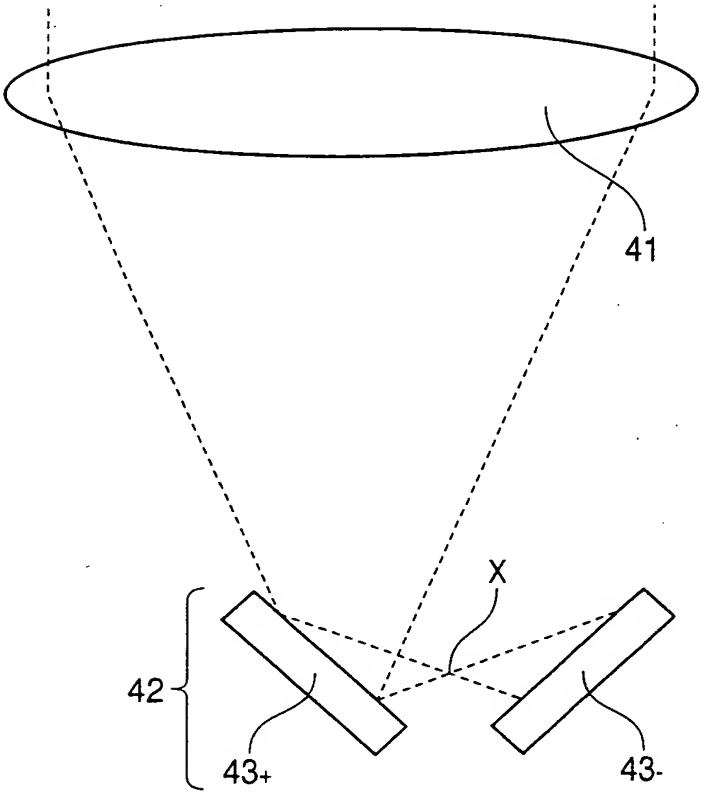


FIG. 5

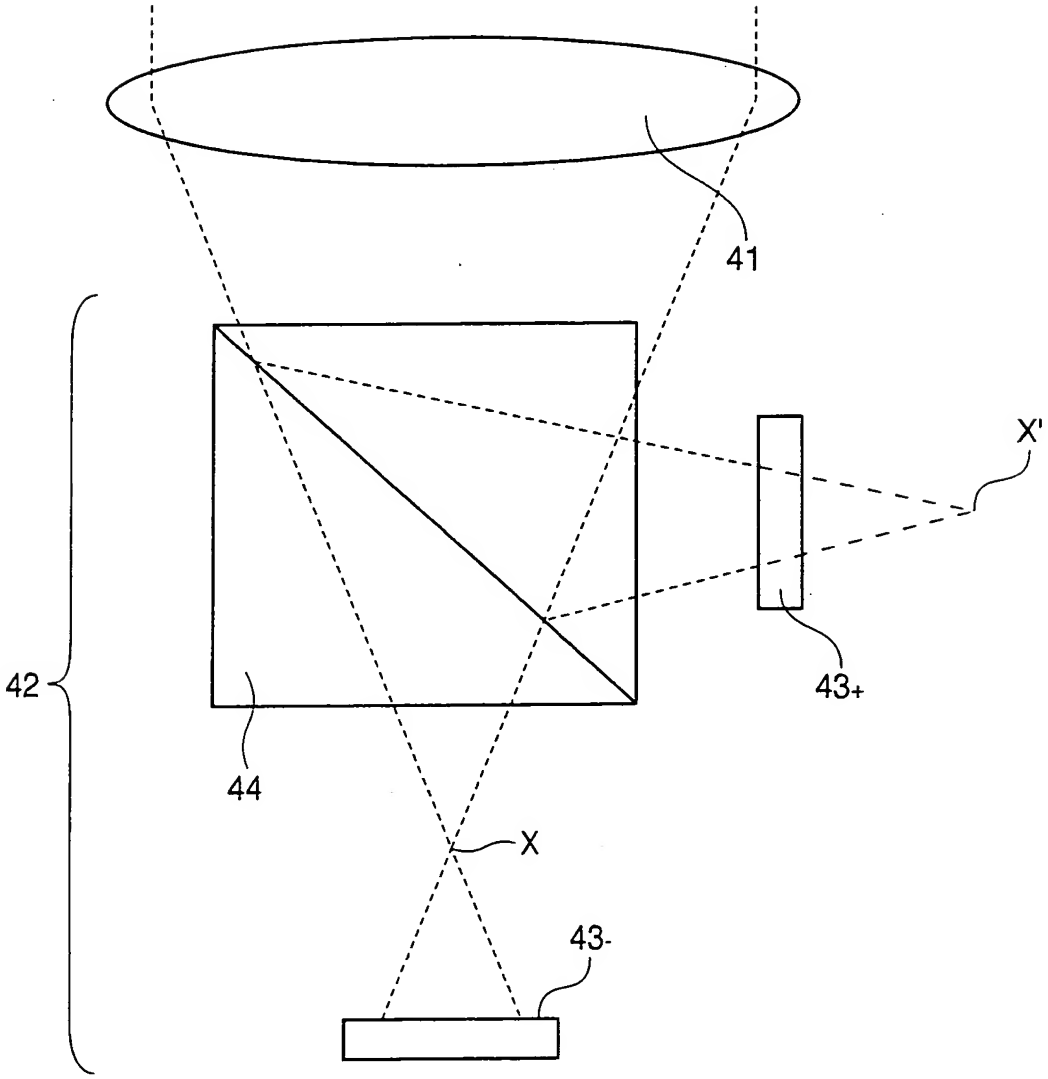


FIG. 6

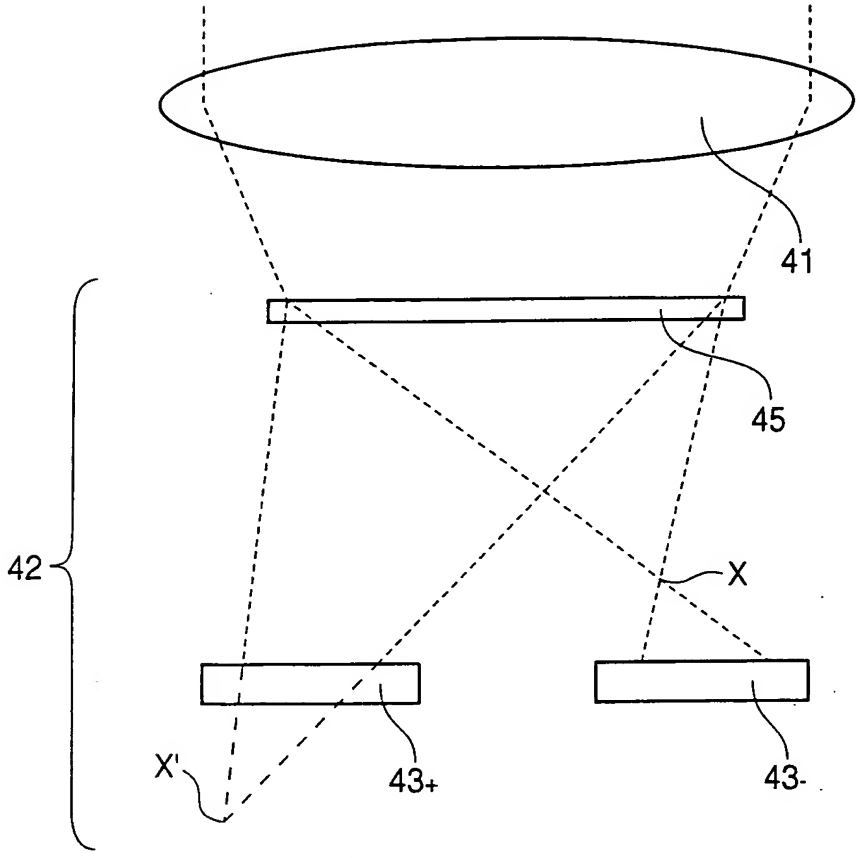



FIG. 7

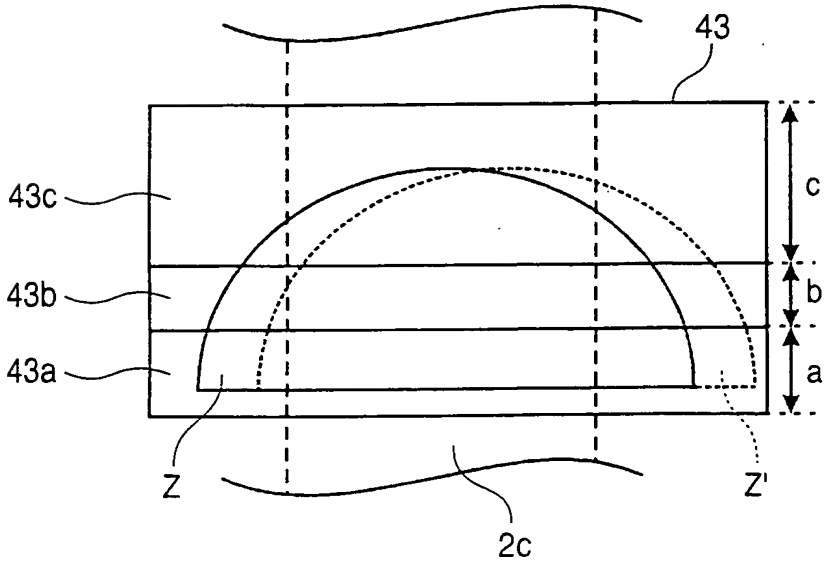


FIG. 8

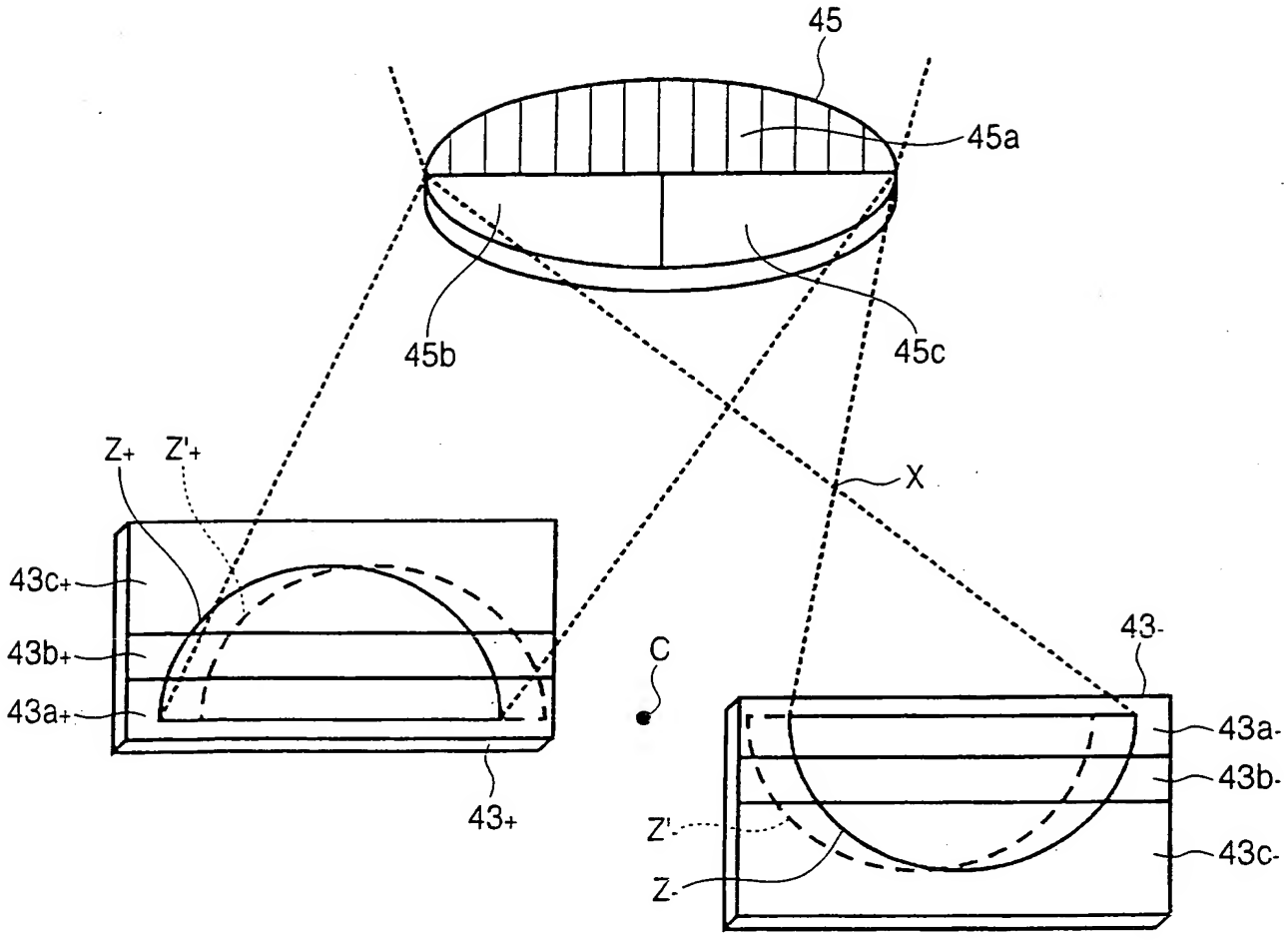


FIG. 9

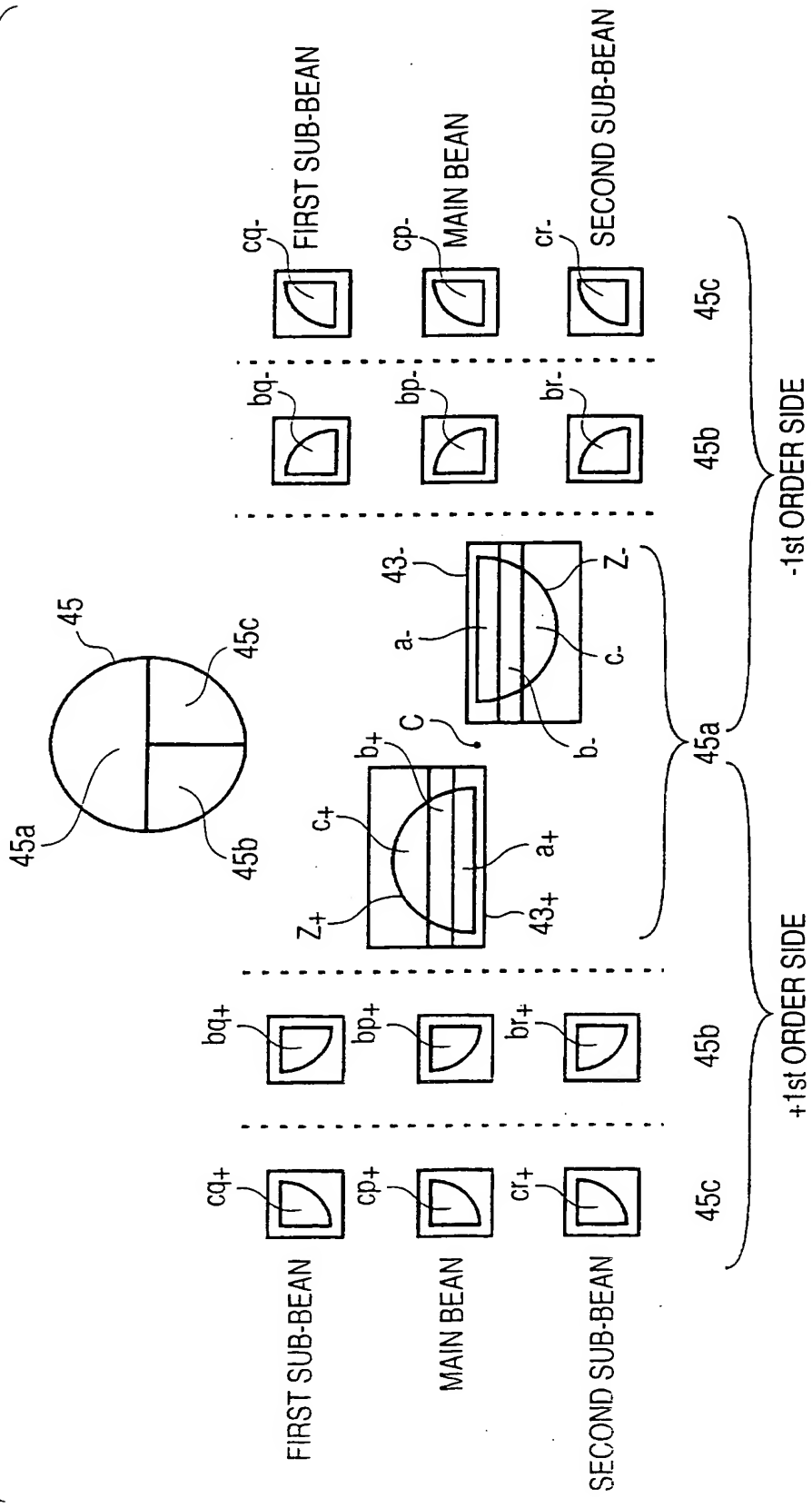

45
45a
45b
45c
cq+
cp+
cr+
FIRST SUB-BEAN
MAIN BEAN
SECOND SUB-BEAN
bq+
bp+
br+
Z+
c+
b+
C
a+
43+
43-
a-
c-
b-
Z-
bq-
bp-
br-
cq-
cp-
cr-
FIRST SUB-BEAN
MAIN BEAN
SECOND SUB-BEAN
+1st ORDER SIDE
-1st ORDER SIDE

FIG. 10

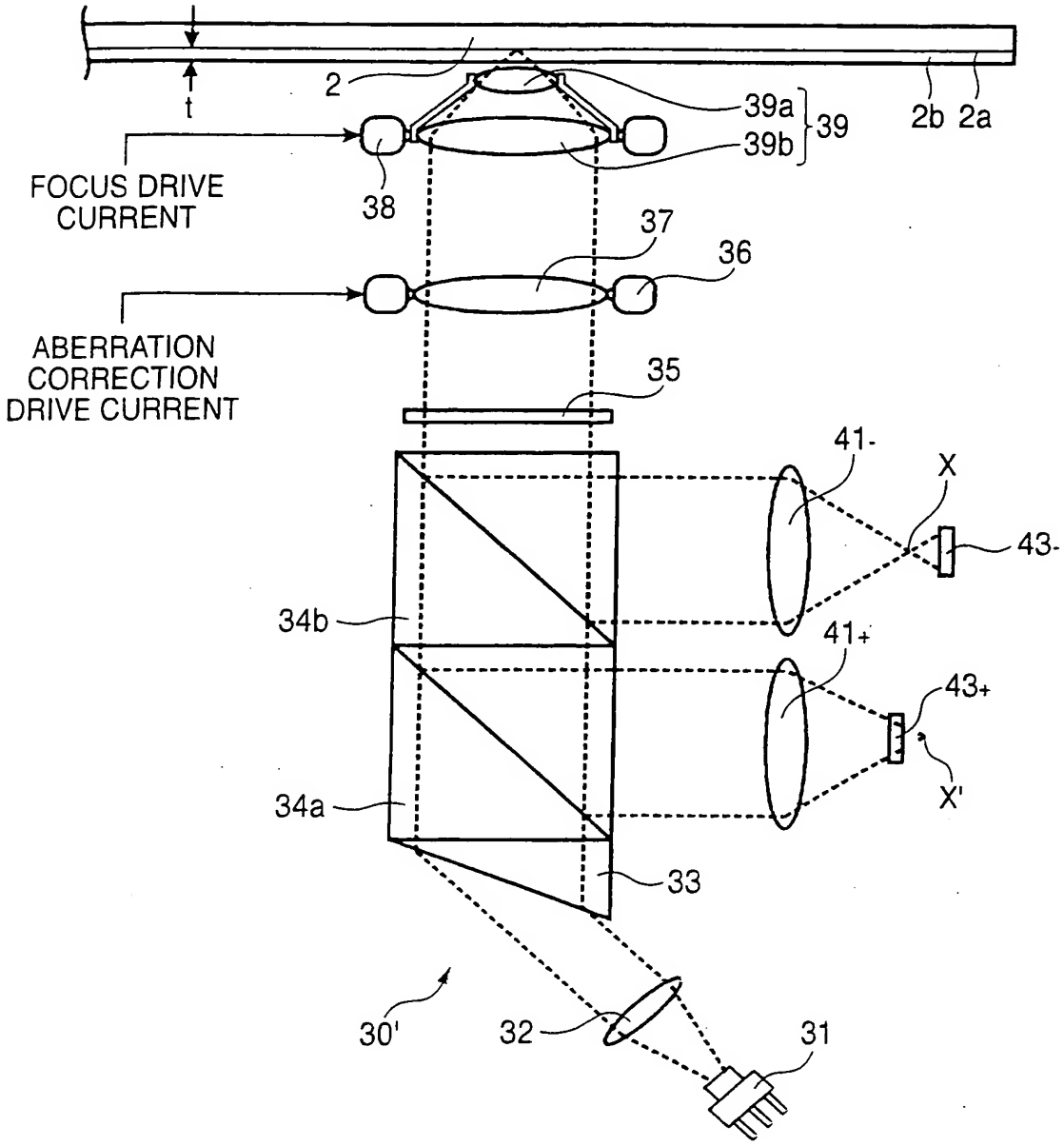

t
2
39a
39b
39
2b
2a
FOCUS DRIVE CURRENT
38
37
36
ABERRATION CORRECTION DRIVE CURRENT
35
41-
X
43-
34b
41+
43+
X'
34a
33
30'
32
31

FIG. 11

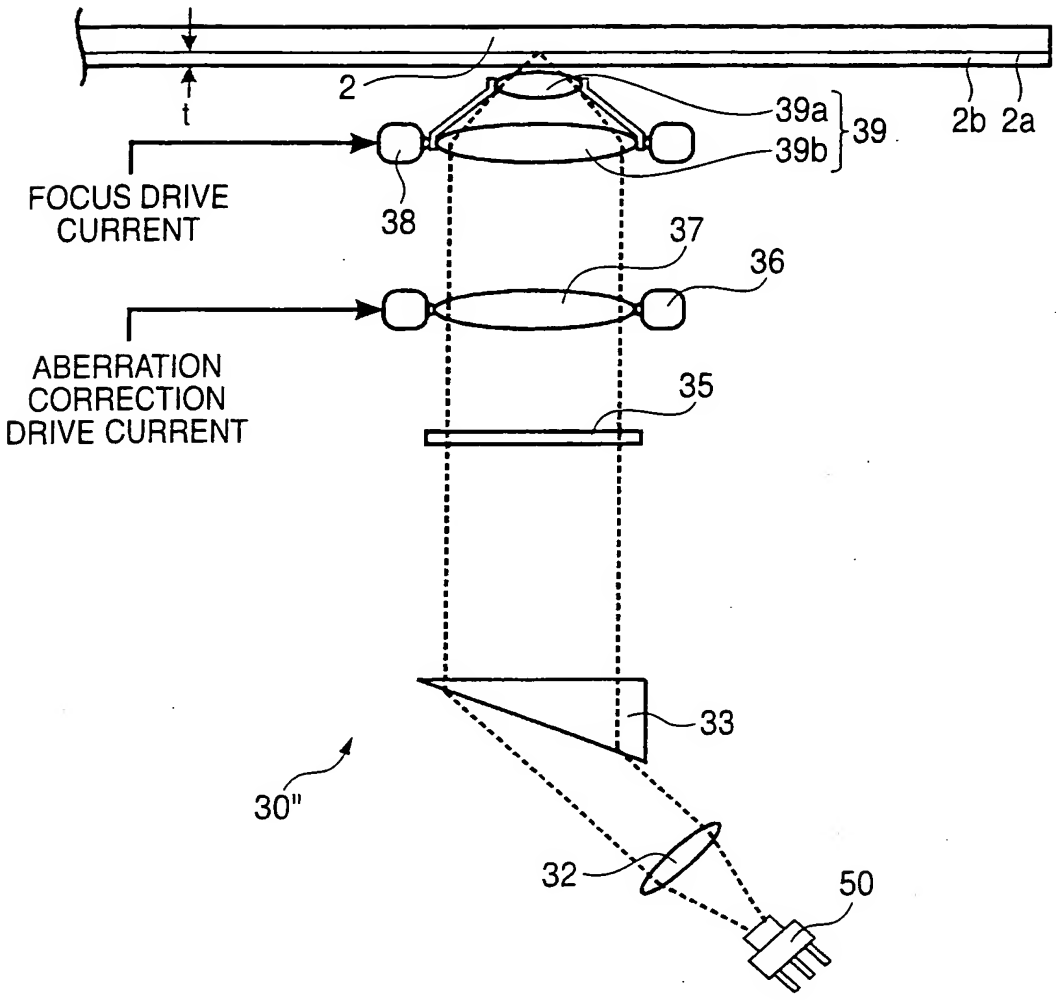

t
2
39a
39b
39
2b
2a
FOCUS DRIVE CURRENT
38
37
36
ABERRATION CORRECTION DRIVE CURRENT
35
33
30"
32
50

FIG. 12

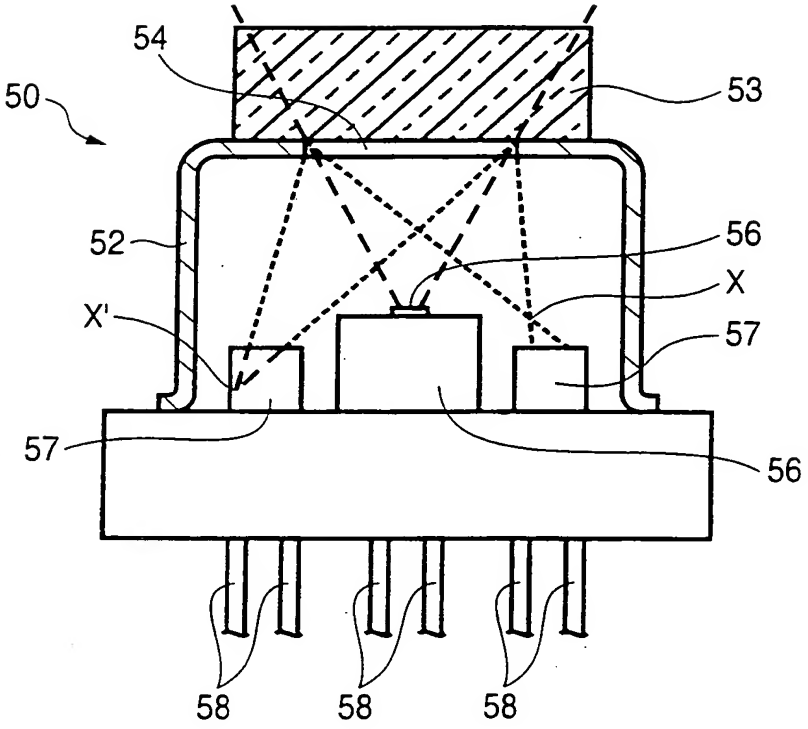


FIG. 13A

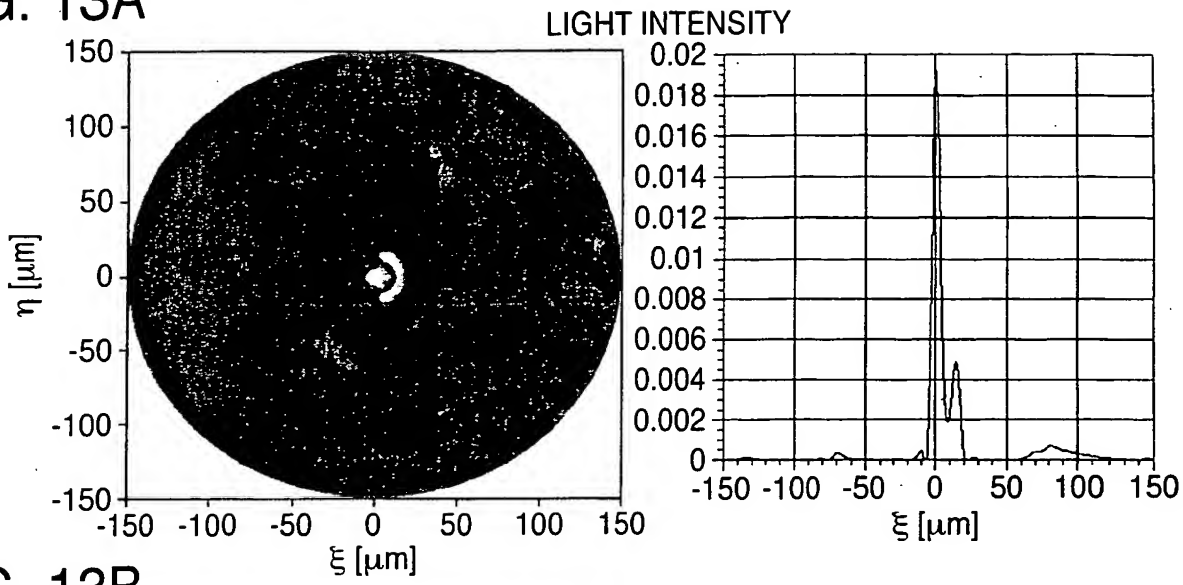



FIG. 13B

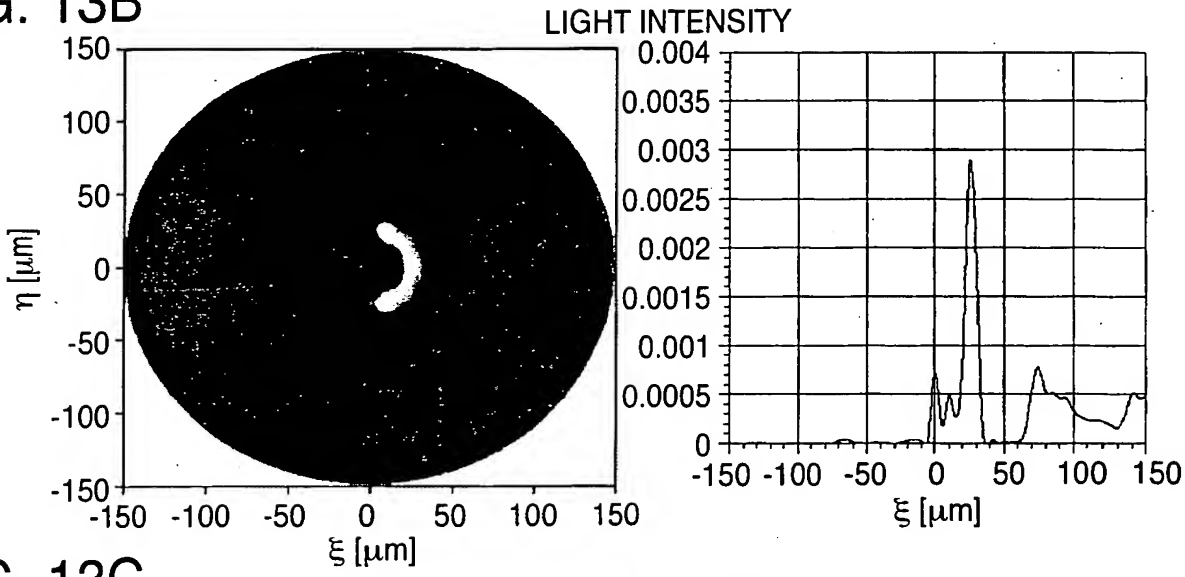



FIG. 13C

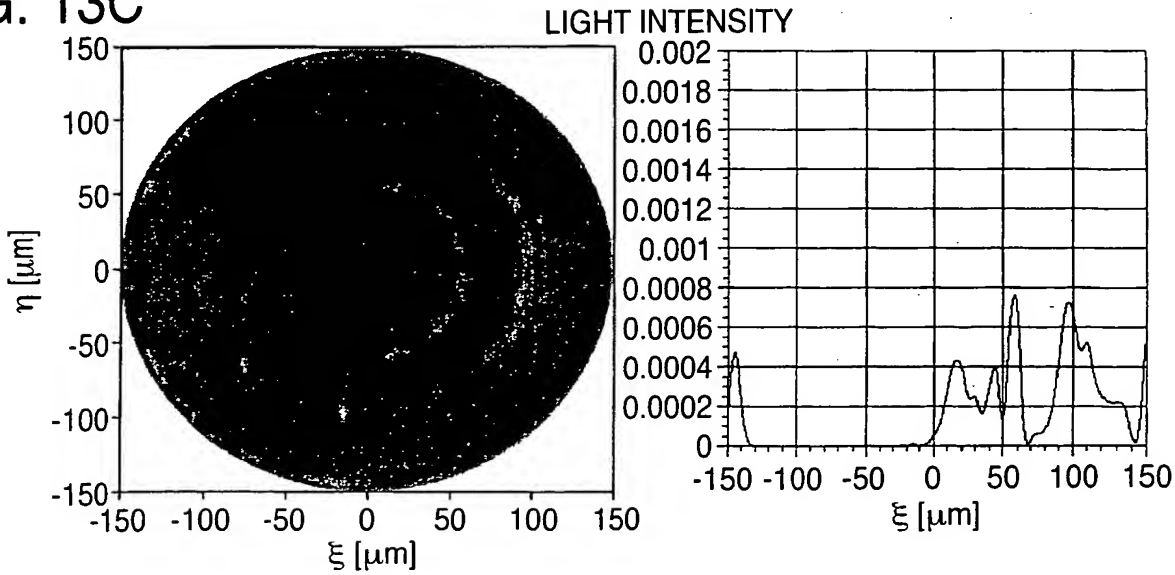


FIG. 14A

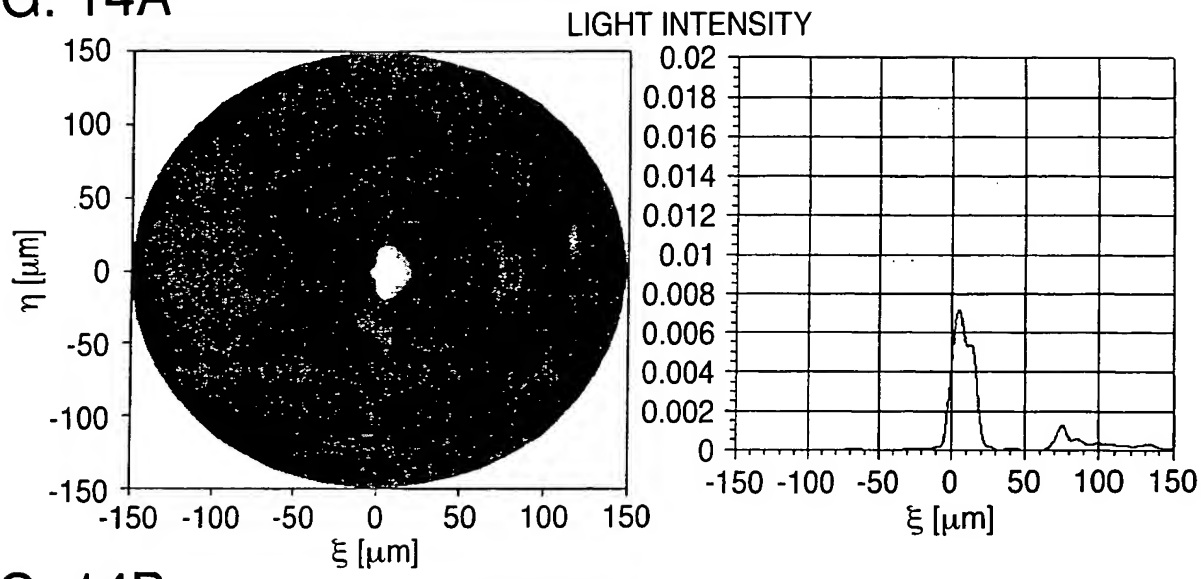



FIG. 14B

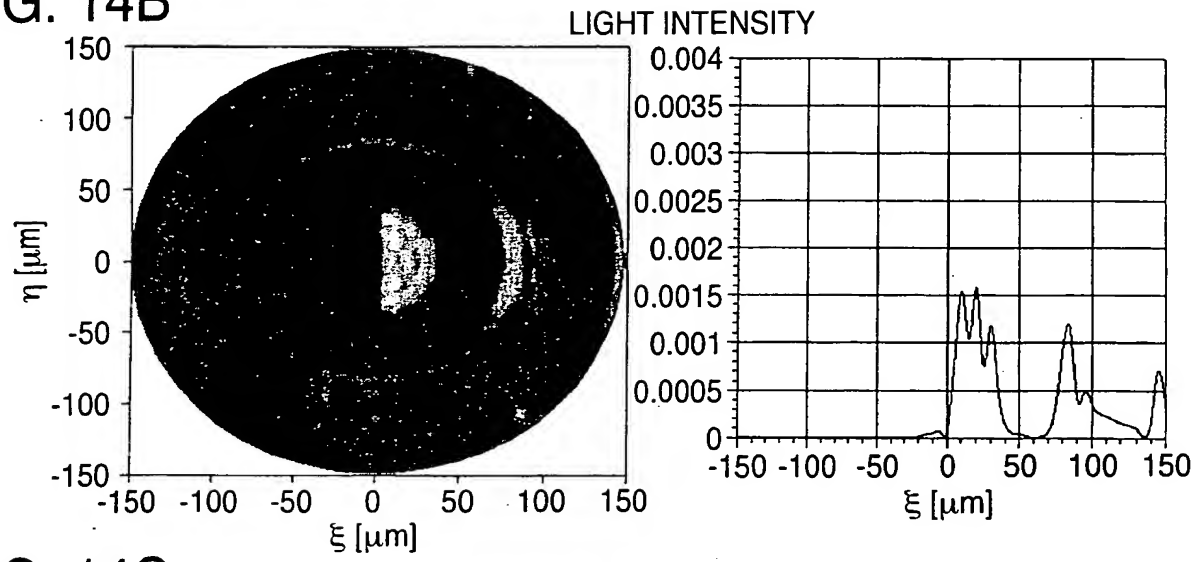



FIG. 14C

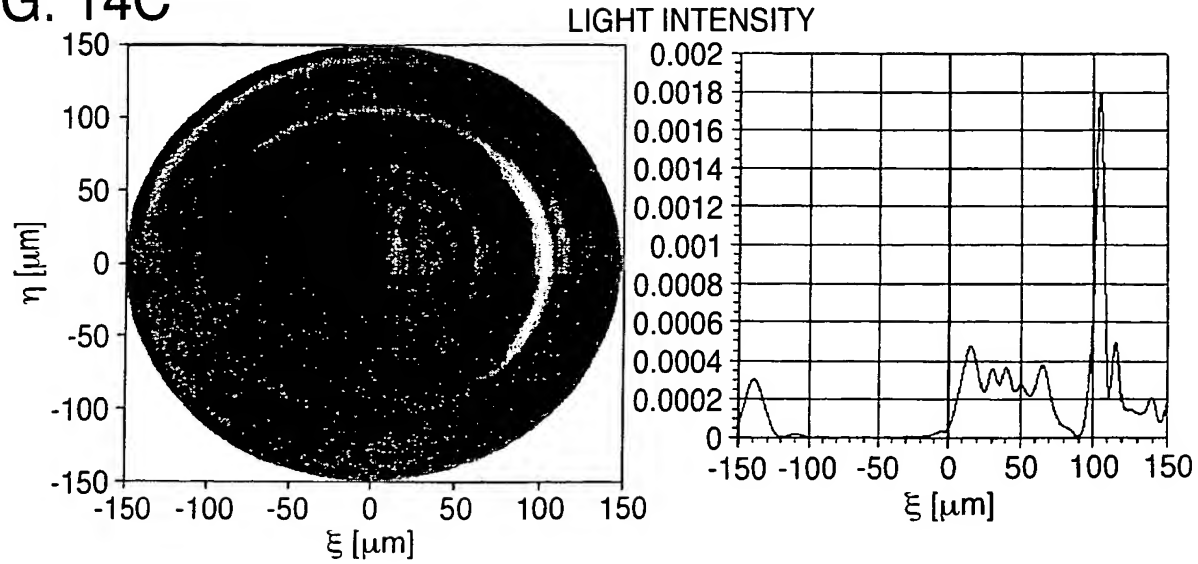


FIG. 15A

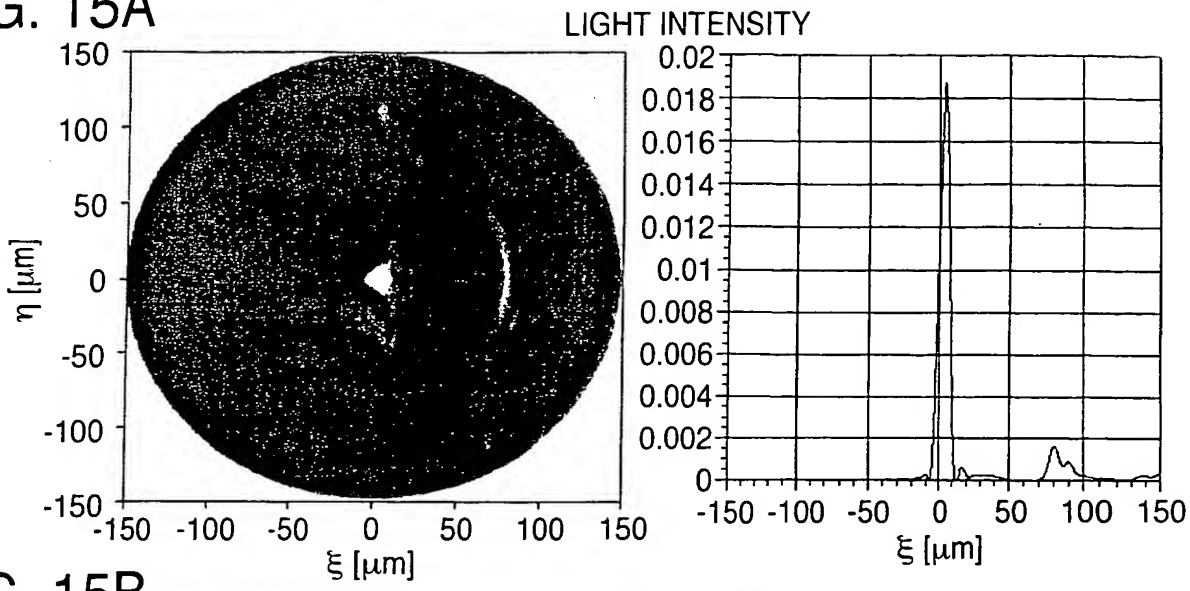



FIG. 15B

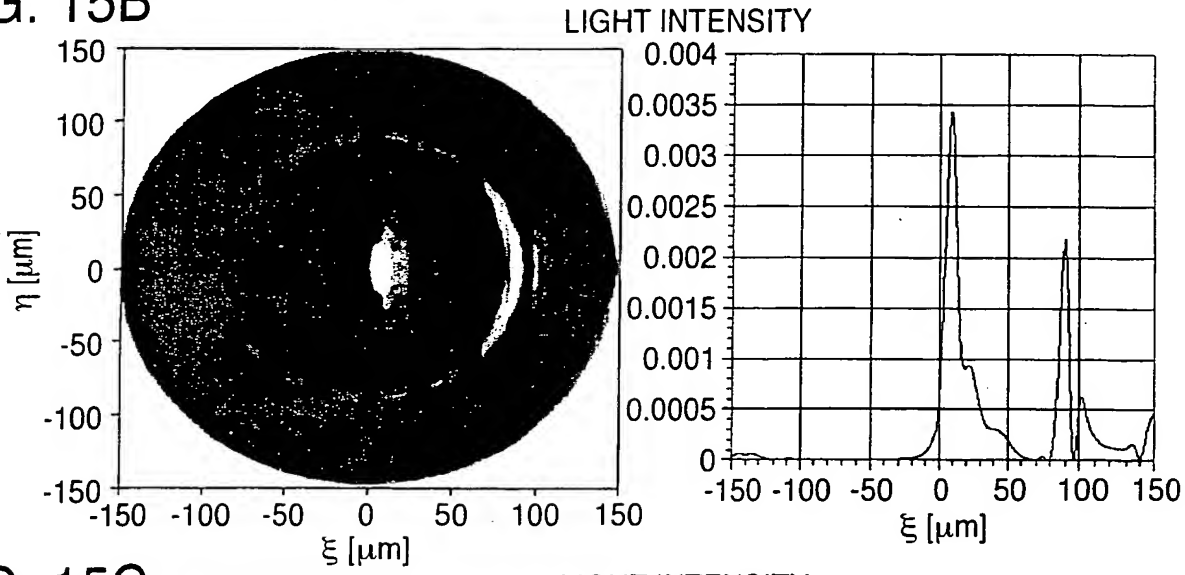



FIG. 15C

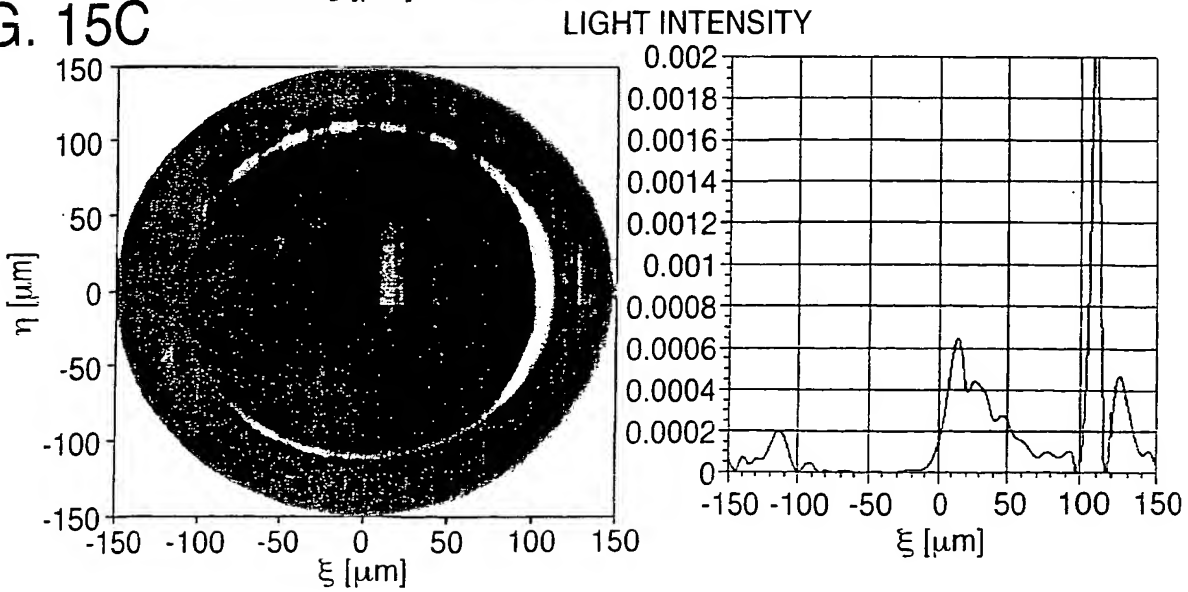


FIG. 16

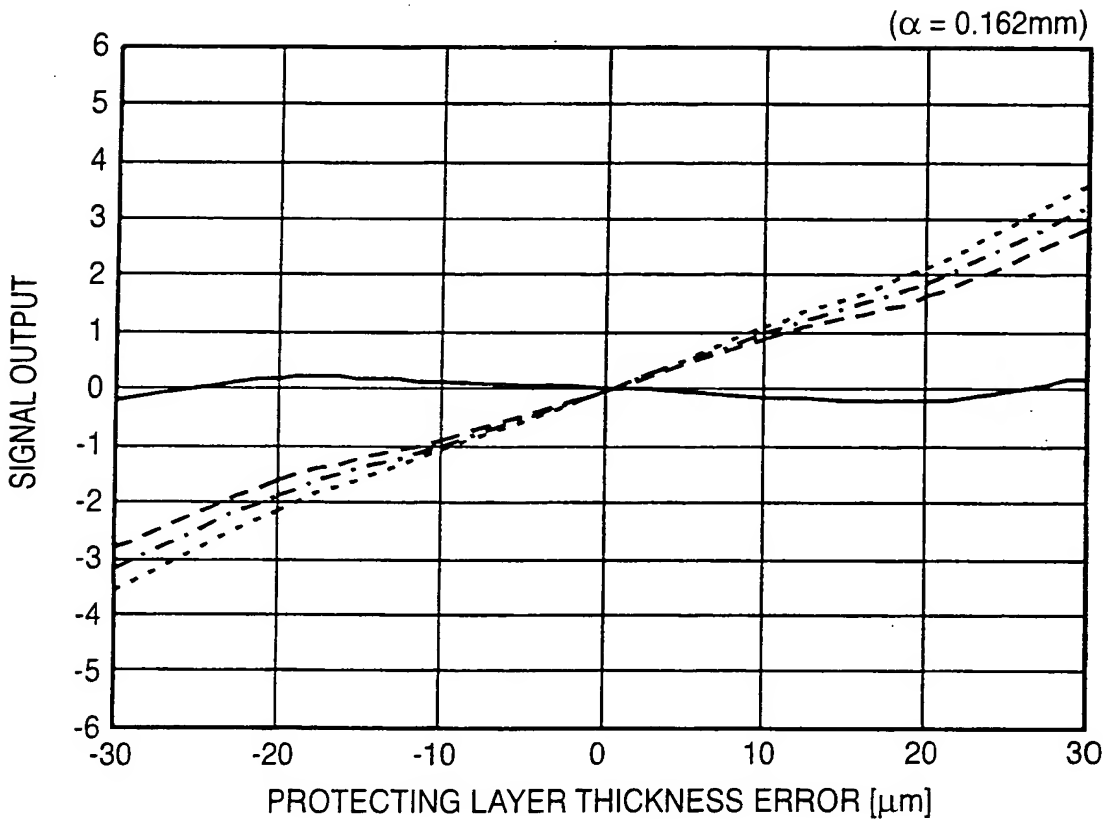

(α = 0.162mm)
SIGNAL OUTPUT
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-30
-20
-10
0
10
20
30
PROTECTING LAYER THICKNESS ERROR [μm]
– – – – (a+ + b- + c-) - (a- + b+ + c+)
——— (a+ + b+ + c-) - (a- + b- + c+)
– · – · – (a+ + b-) - (a- + b+)
- - - - - - (a+ + b- + c+) - (a- + b+ + c-)

FIG. 17

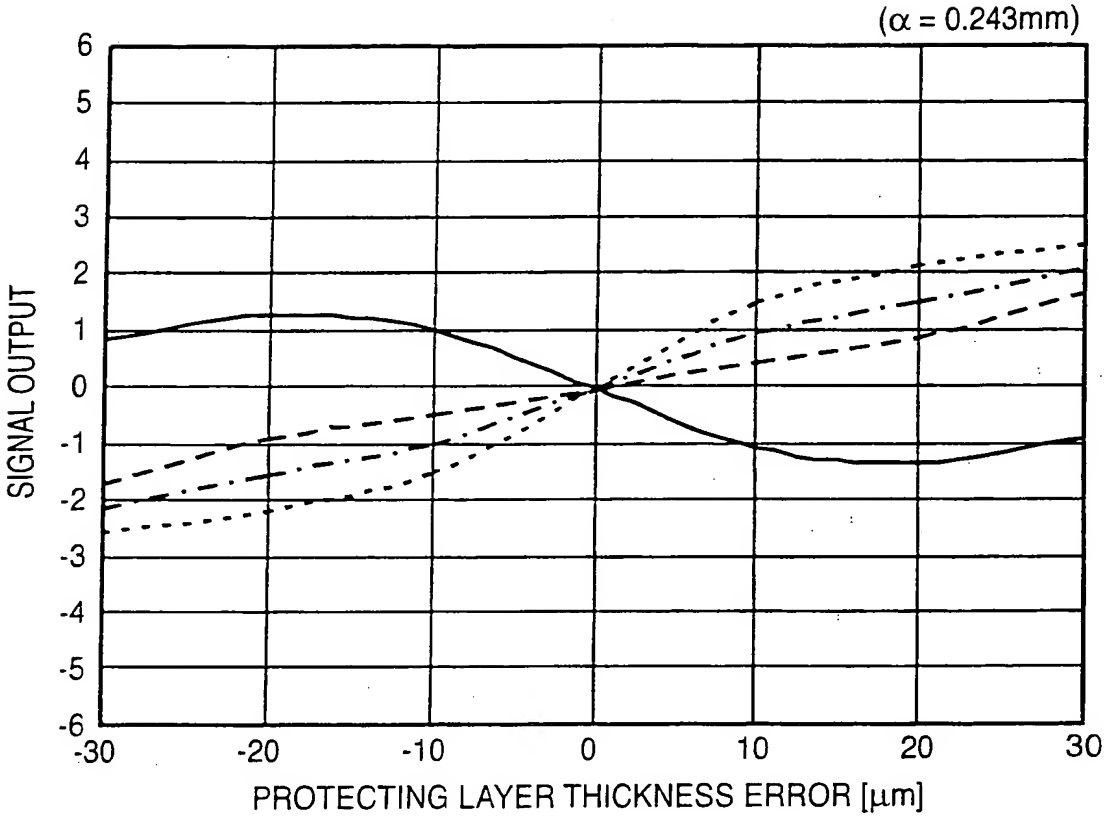

(α = 0.243mm)
SIGNAL OUTPUT
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-30
-20
-10
0
10
20
30
PROTECTING LAYER THICKNESS ERROR [μm]
– – – – $(a_+ + b_- + c_-) - (a_- + b_+ + c_+)$
——— $(a_+ + b_+ + c_-) - (a_- + b_- + c_+)$
– · – · – $(a_+ + b_-) - (a_- + b_+)$
- - - - - - $(a_+ + b_- + c_+) - (a_- + b_+ + c_-)$

FIG. 18

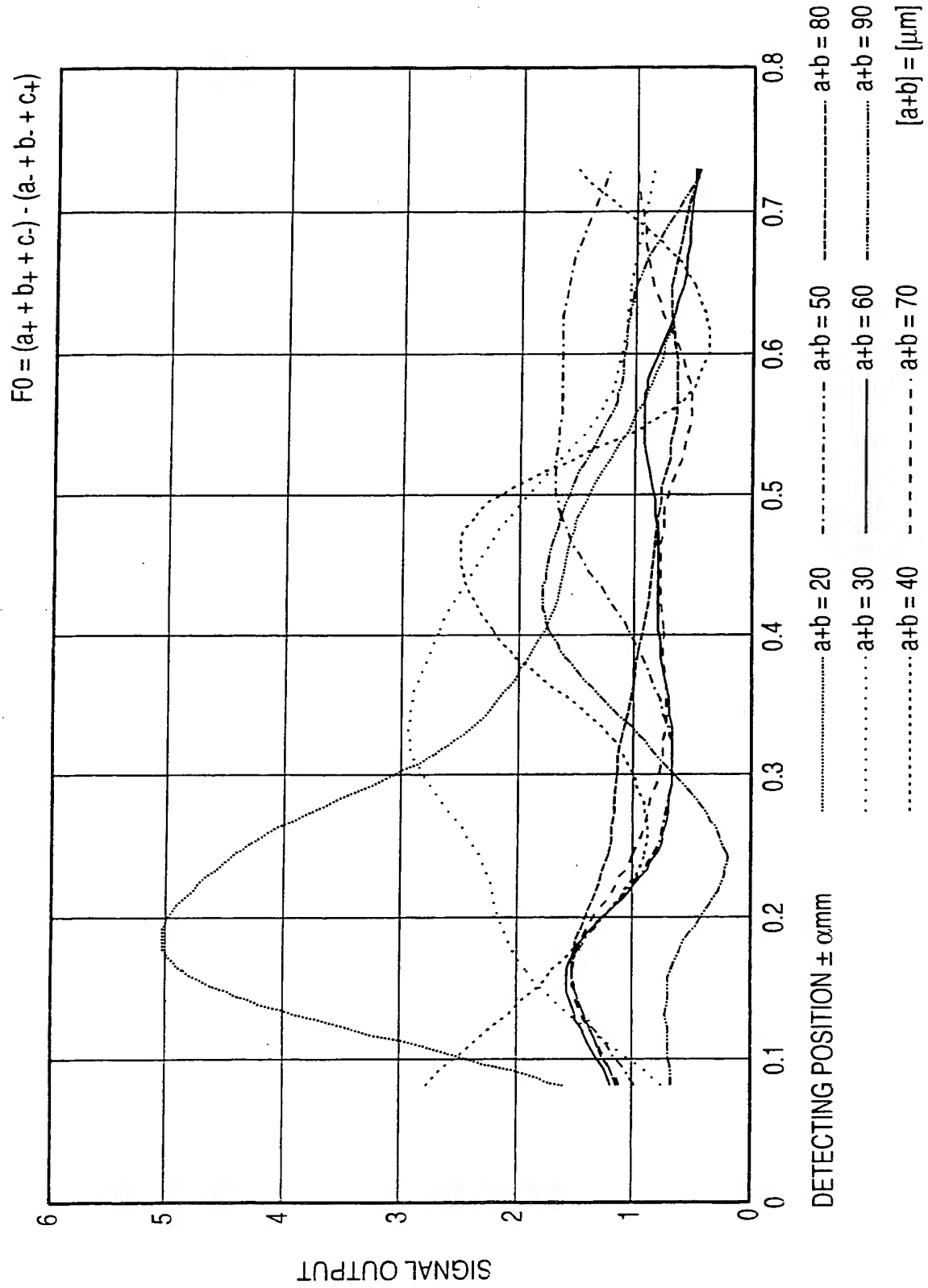
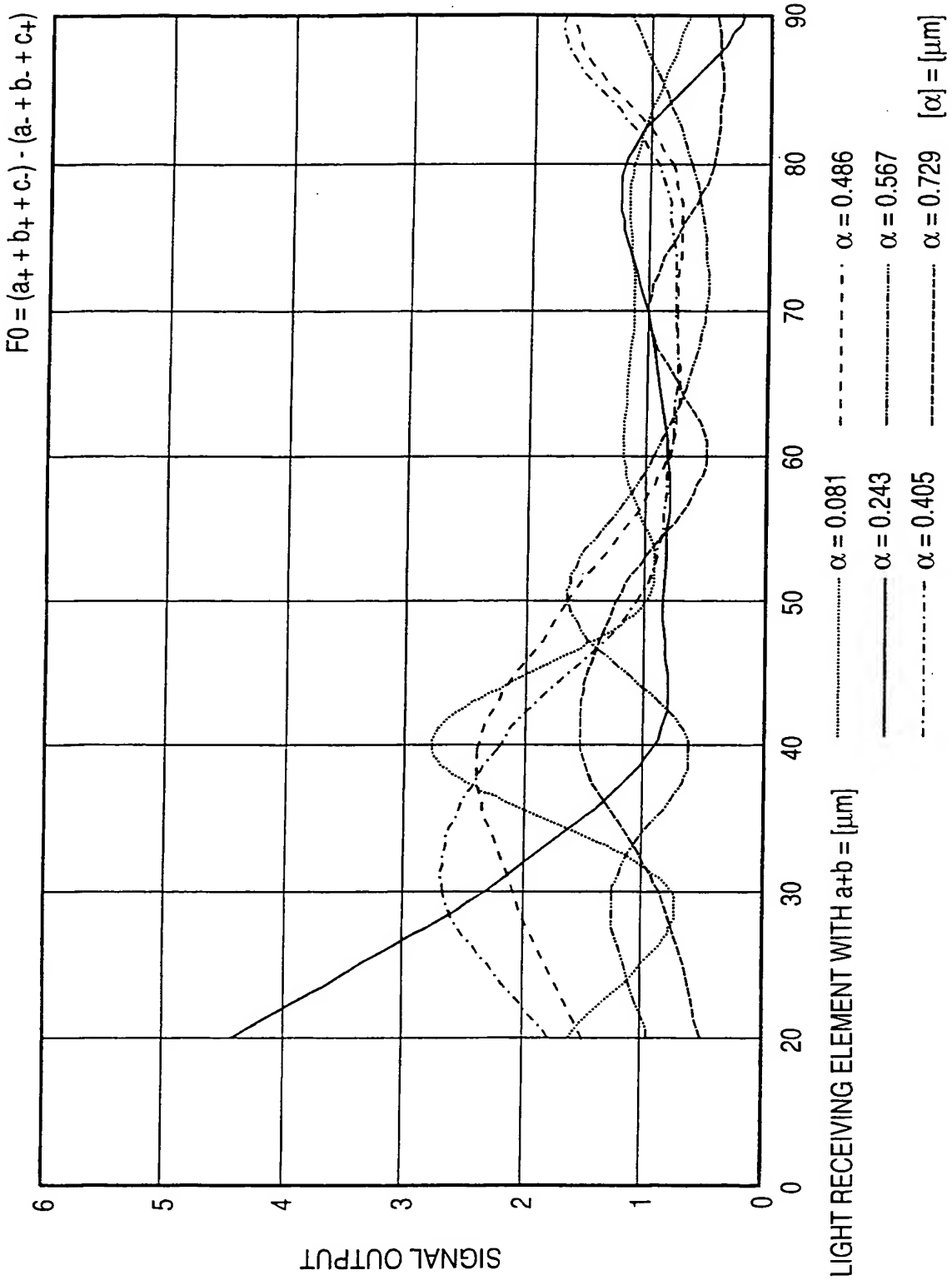

F0 = (a+ + b+ + c-) - (a- + b- + c+)
SIGNAL OUTPUT
0
1
2
3
4
5
6
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
DETECTING POSITION ± αmm
a+b = 20
a+b = 30
a+b = 40
a+b = 50
a+b = 60
a+b = 70
a+b = 80
a+b = 90
[a+b] = [μm]

FIG. 19


F0 = (a+ + b+ + c-) - (a- + b- + c+)
SIGNAL OUTPUT
0
1
2
3
4
5
6
0
20
30
40
50
60
70
80
90
LIGHT RECEIVING ELEMENT WITH a+b = [μm]
α = 0.081
α = 0.243
α = 0.405
α = 0.486
α = 0.567
α = 0.729
[α] = [μm]